Attraction to men and women predicts sexual dimorphism preferences

Abstract

Objectives: Sexual orientation categories are commonly differentiated in the partner preference literature. Yet little is known about how the variability within each category influences partner preferences. *Methods:* We investigated women's (N = 27,611) preferences for sexual dimorphism in male faces in relation to self-reports of sexual attraction to men /women (from 'not at all' to 'very'). *Results:* Self-identified heterosexual women reported considerable variation in sexual attraction levels. We found that sexual dimorphism preferences related positively with attraction to men and negatively with attraction to women. *Conclusions:* Such variability in women's sexuality should be taken into account when investigating partner preferences.

Keywords: sexual fluidity, masculinity, preferences, faces, sexual dimorphism

Attraction to men and to women predicts sexual dimorphism preferences

Human sexuality is multifaceted. Two of its facets are sexual identity and sexual attraction. Sexual identity refers to the labels individuals choose to describe their sexuality and sexual attraction refers to whom/ what characteristics individuals are attracted to (Smith, Rissel, Richters, Grulich, & De Visser, 2003). Prior to 1948, most of the research on human sexuality had been restricted to the binary categories of heterosexual and homosexual. In 1948, however, Alfred Kinsey created a scale primarily based on sexual behavior, experiences, and sexual fantasies (Kinsey, Pomeroy, & Martin, 1948; Kinsey, Martin, Pomeroy, & Gebhard, 1953; Drucker, 2014). The Kinsey scale ranged between "exclusive heterosexuality" and "exclusive homosexuality" (Sell, 1997). The use of the Kinsey scale revealed the fluidity of human sexuality and since then much research has been carried out across many fields to understand its complexities (Allen et al., 2017).

Many studies, for instance, have been devoted to understanding the continuum of sexuality by exploring its different dimensions (Berkey, Perelman-Hall, & Kurdek, 1990; Coleman, 1987; Vickberg & Deaux, 2005). When focusing on women's sexuality, researchers have provided evidence for sexual fluidity being a key feature of sexual orientation (Diamond, 2009, but see Apostolou, 2018). For example, one study found that 52% of self-identified heterosexual women reported some degree of sexual attraction to women and 22% had at least one female sexual partner in their past (Nichols, 2005).

Researchers have also found that the degree to which an individual's sex drive can be influenced by external factors, referred to as "erotic plasticity", varies by gender (Baumeister, 2000). More specifically, women's sexuality exhibits larger effects to the influences of culture, learning, and social factors when compared to men's sexuality (Baumeister, 2004). Studies

examining physiological responses also support the notion that women's sexuality is more malleable relative to that of men's (e.g., Costa, Braun, & Birbaumer, 2003; Chivers, Rieger, Latty & Bailey, 2004).

Within the partner preference literature, however, research typically still only uses three categories of sexual orientation: heterosexual, bisexual, and homosexual (e.g., Little, Cohen, Jones & Belsky, 2007). Using these categories, researchers have found that heterosexual women prefer more masculine male faces than homosexual women (Glassenberg, Feinberg, Jones, Little & DeBruine, 2010). As a result, partner preference studies usually restrict their analyses to heterosexual women when examining preferences (e.g., Pawlowski, 2003; Cornwell et al., 2006; Watkins et al., 2017).

Among heterosexual women, researchers have found much variance in sexual dimorphism preferences (i.e., the differences between males and females, commonly referred to as masculinity and femininity). For instance, studies have found that attraction to facial sexual dimorphism varies according to pathogen disgust sensitivity (DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010), age of menarche (Batres & Perrett, 2016), and even environmental harshness (Little, Cohen, Jones & Belsky, 2007). Understanding differences in women's sexual dimorphism preferences given the trade-off between the costs and benefits of choosing a masculine partner has been the subject of much research. More masculine men have higher dominance (Batres, Re, & Perrett, 2015), and there is some evidence that more masculine men are healthier (Rhodes, Chan, Zebrowitz, & Simmons, 2003), but they are also more aggressive (Archer, 1991; Olweus, Mattsson, Schalling, & Löw, 1988), and invest less in their relationships (Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002) and children (Muller, Marlowe, Bugumba, & Ellison, 2009). As a result, women may actually be employing mixed strategies when it comes to sexual dimorphism

preferences. For instance, women's preferences for sexual dimorphism may change with their relationship status (Penton-Voak et al., 1999 but see Watkins, 2012), suggesting that the benefits of choosing a masculine partner are greater under certain conditions. No study, however, has examined whether variability in sexual attraction also influences sexual dimorphism preferences.

We, therefore, sought to explore whether variation in sexual attraction to men/women among self-reported heterosexual women is associated with sexual dimorphism preferences in male faces. We believe examining the possibility of this link is important because within the partner preference literature, research typically does not acknowledge variation within sexual orientation categories. Additionally, it would give us further insight into which factors shape individual differences in women's preferences. If, for example, a woman self-identifies as heterosexual and prefers feminine-looking men this preference could, in part, be a result of her self-reported high sexual attraction to women. Examining this possible link would allow us to better understand the cross-over between sexual identity and sexual attraction. Researchers have found that heterosexual women prefer more masculine male faces than homosexual women (Glassenberg et al., 2010) and therefore, we hypothesized that among women who self-identified as heterosexual, sexual dimorphism preferences would be positively related to sexual attraction to men and negatively related to sexual attraction to women. To investigate these relationships, we included the below five variables which researchers have found to influence masculinity preferences.

(1) Age: Several studies have found a positive correlation between a woman's age, within fertile years, and preferences for sexual dimorphism in male faces (e.g., Little et al., 2001). (2) *Hormonal contraceptives*: Women using hormonal contraceptives have been shown to have reduced masculinity preferences (Little, Burriss, Petrie, Jones & Roberts, 2013). However, more

recent research using larger samples has found no evidence that hormonal contraceptives decrease sexual dimorphism preferences (Jones et al., 2018; Marcinkowska, Hahn, Little, DeBruine, & Jones, 2019). *(3) Relationship status:* Researchers have found that women with partners prefer more masculine faces than women without partners (e.g., Penton-Voak et al., 1999 but see Watkins, 2012). Additionally, an interaction between hormonal contraceptives and relationship status has also been found (Little, Jones, Penton-Voak, Burt & Perrett, 2002). *(4) The attitude subscale from the Sociosexual Orientation Inventory:* Women with an unrestricted sociosexual orientation have been found to prefer men with more masculine faces (Waynforth, Delwadia & Camm, 2005). Having an unrestricted sociosexual orientation refers to having a greater willingness to engage in uncommitted sexual relationships (Penke & Asendorpf, 2008; Simpson & Gangestad, 1991). Sociosexual orientation is measured by asking participants how much they agree or disagree with questions such as "Sex without love is OK". Of the three facets of sociosexuality (i.e., behavior, attitude, and desire), attitude towards sexual relationships is the best predictor of women's preferences in potential partners (Quist et al., 2012). *(5) Own attractiveness:* Women who rate themselves as more attractive have been found to prefer more masculine men (Little et al., 2001).

Methods

Materials

Face images of university students aged 18-22 photographed facing forward, under constant camera and lighting conditions, with neutral expressions, no adornments, and closed mouths were delineated with 189 points using custom software and aligned to a standard inter-pupillary distance. Seven male composite images were created (four composites were Caucasian, one was East Asian, one was South Asian, and one was African) by averaging together three male

faces of the same ethnicity. A male face prototype was created by blending photographs of a larger sample of > 30 men and a female face prototype was created equivalently by blending photographs of women; photographs were age-matched and Caucasian. We then used the prototypes to create masculinity transforms with ± 50% of the shape difference between the male and the female prototypes while holding color and texture constant. For each male composite image, we created one image which was 50% feminized and one image that was 50% masculinized. This resulted in a total of seven pairs of male faces that differed in sexual dimorphism level.

The questionnaire asked for the participant's sex, ethnicity, sexual orientation (heterosexual/ bisexual/ homosexual), level of sexual attraction to women (1 = 'not at all' to 7 = 'very'), level of sexual attraction to men (1 = 'not at all' to 7 = 'very'), and variables known to influence masculinity preferences (i.e., age, hormonal contraceptive use, relationship status, sociosexual attitude, and own attractiveness), because controlling for them could be important to uncovering the relationships of interest.

Procedure

The questionnaire was administered online using a web-based interface built through a collaboration between the British Broadcasting Corporation (BBC) and the [removed as per double-blind review policy]. Ethical criteria from the BBC editorial policy and guidelines were followed. Participants were first presented with the questionnaire and then with the seven pairs of faces, where one pair appeared at a time. The order of the pairs and which face was on the left/right were both randomized. Participants were instructed to select which face from each pair they considered to be the most attractive.

Participants

Twenty-seven thousand, six hundred and eleven heterosexual women aged 18-25 (*M* years ± *SD* = 21.56 ± 2.28) completed the study (see Reimers, 2007 for details). Sixteen thousand, two hundred and ten women reported not using hormonal contraceptives and 11,401 reported using hormonal contraceptives. Ten thousand, four hundred and forty nine women reported being single and 13,590 reported being in a relationship. The participants scored average was 2.95 (*SD* = 1.64) on their sociosexual attitude scores (ranging from 1-7) and an average of 4.47 (*SD* = 1.29) on their own attractiveness scores (measured on a 7-point scale from 'not at all' to 'very').

Results

For all the analyses, sexual dimorphism preferences were calculated by taking the proportion of masculine faces selected across the seven pairs. Univariate effects were first analyzed for every variable, with the dependent variable being average sexual dimorphism preference (see Table 1). On the question of sexual attraction to men, 7.30% reported scores of 1-5, 20.60% reported a 6, and 72.10% reported a 7. On the question of sexual attraction to women, 37.40% reported a 1, 34.20% reported a 2, and 28.40% reported scores of 3-7. Given the low number of participants reporting scores of 1-5 on the question of sexual attraction to men and scores of 3-7 on the question of sexual attraction to women, we log transformed the responses for those questions for the analyses, though the same pattern of results was found if we grouped these responses as one level. Additionally, the same pattern of results emerged when centering the variables using z-score transforms.

The data were then analyzed using an ANCOVA (dependent variable: average sexual dimorphism preference; fixed factors: sexual attraction to men, sexual attraction to women, relationship status (2 levels), contraceptive use (2 levels); covariates: own age, mean sociosexual attitude score (Cronbach's α between the three questions = 0.79), own attractiveness). The model

analyzed the main effects of all variables and the interaction between contraceptive use and relationship status as per previous research (Little et al., 2001; Little et al., 2013; Penton-Voak et al., 1999; Little et al., 2002; Waynforth, Delwadia & Camm, 2005; Quist et al., 201).

The ANCOVA revealed that there was a significant main effect for every variable in the model except for sociosexual attitude [$F(1, 22858) = 0.24$, $p = .623$, partial $\eta^2 < .001$] and hormonal contraceptive use [$F(1, 22858) = 2.18$, $p = .140$, partial $\eta^2 < .001$]. A greater proportion of masculine face shapes were chosen as attractive by single women [$F(1, 22858) = 46.84$, $p < .001$, partial $\eta^2 = .002$], older women [$F(1, 22858) = 23.36$, $p < .001$, partial $\eta^2 = .001$], and women who consider themselves as more attractive [$F(1, 22858) = 66.90$, $p < .001$, partial $\eta^2 = .003$]. The ANCOVA revealed a negative effect of level of sexual attraction to women [$F(6, 22858) = 6.21$, $p < .001$, partial $\eta^2 = .002$] and a positive effect of level of sexual attraction to men [$F(6, 22858) = 11.34$, $p < .001$, partial $\eta^2 = .003$] on sexual dimorphism preferences. There was also a significant interaction between hormonal contraceptive use and relationship status [$F(1, 22858) = 11.44$, $p < .01$, partial $\eta^2 = .001$], with contraceptive use having the same directional effect but impacting women in relationships more than single women. Women in relationships who were not using hormonal contraceptives preferred more masculine men than those using hormonal contraceptives.

Discussion

It is notable that 62.60% of self-identified heterosexual women reported some level of sexual attraction to women. Our results are similar to those of a previous study that found that 52% of heterosexual women reported some degree of sexual attraction to women (Nichols, 2005). These results are important to acknowledge in order for health care providers to better understand sexual fluidity within the self-identified labels of clients (Oswalt, Evans, & Drott, 2016). Our results are also in line with sexuality research which proposes that sexual orientation operates on a continuum

rather than as a categorical distribution. For example, research using the Kinsey Scale is primarily based on sexual behavior, experiences, and sexual fantasies (Kinsey, Pomeroy, & Martin, 1948; Kinsey, Martin, Pomeroy, & Gebhard, 1953) and research using the Klein Sexual Orientation Grid assesses seven dimensions including sexual attraction, sexual behavior, sexual fantasies, emotional preference, social preference, self-identification, and heterosexual/ homosexual life-style (Klein, Sepekoff, & Wolf, 1985). The finding that even amongst participants who report an exclusively heterosexual label, some report attraction towards and/or partners of their non-preferred sex (Vrangalova & Savin-Williams, 2012; Rupp, Taylor, Regev-Messalem, Fogarty, & England, 2014) further supports the fluidity of sexual orientation.

Such fluidity and our results showing a link between sexual attraction to men/women and sexual dimorphism preferences suggest that future facial preference research would benefit from collecting and analyzing data on a sexual orientation continuum rather than only on sexual orientation categories. Doing so will have two benefits: it will increase the accuracy and sensitivity of the analyses on the other variables of interest and, second, it will provide a more comprehensive understanding of how sexual orientation affects partner preferences. For example, previous partner preference research has found a positive correlation between age and sexual dimorphism preferences (Little et al., 2001). Yet the sexual attraction literature provides evidence that sexual orientation changes with age (Diamond, 2000 & Diamond, 2008). Therefore, the link between a woman's age and her sexual dimorphism preferences needs to be reexamined taking into account changes in sexual orientation.

Among heterosexual women, our results showed that sexual attraction to men and women are both important factors in accounting for variability in sexual dimorphism preferences. Sexual attraction to men was positively related to sexual dimorphism preferences, and, independently,

sexual attraction to women was negatively related to sexual dimorphism preferences. Sexual attraction to men and women, therefore, shows three interesting characteristics: varying across individuals, operating as at least partially opponent processes, and predicting partner choice in ways that are independent of other variables affecting facial preferences. That levels of sexual attraction to men and women predict sexual dimorphism preferences suggests that part of whether women are attracted to men and/or women may relate to their preferences for sexually dimorphic traits. Alternatively, women's preferences for sexually dimorphic traits may contribute to the extent that they are attracted to men and/or women.

It is important to note that the effect sizes we found for sexual attraction to men/women on sexual dimorphism preferences were similar to those of other factors that have previously been explored in the literature (e.g., self-perceived attractiveness). However, all the effect sizes were quite small, perhaps because the preference test was short to facilitate collecting a large sample of data per participant. Thus, while our results suggest that there are some sources of systematic variation in sexual dimorphism preferences, the effects are quite weak. This is consistent with Zietsch, Lee, Sherlock, and Jern's (2015) finding that contextual factors (such as self-perceived attractiveness) are often dwarfed by genetic factors when it comes to women's facial sexual dimorphism preferences.

We found significant univariate effects for all of our variables on sexual dimorphism preferences. However, when analyzing the main effects of all the variables and the interaction between contraceptive use and relationship status, the effects of sociosexual attitude and hormonal contraceptive use were not statistically significant. Previous research has found that women using hormonal contraceptives have reduced masculinity preferences (Little, Burriss, Petrie, Jones & Roberts, 2013). However, a recent study conducted by Jones et al. (2018) using a large-scale

longitudinal dataset found no evidence that hormonal contraceptives decrease masculinity preferences.

Our study was limited in that the participants were first presented with the questionnaire and then with the pairs of faces. Having to answer questions about their sexual orientation and sexual attraction to men/ women could have had an effect on their selections of which faces they found most attractive. Future research should thus examine face preferences before asking about sexuality to control for any potential ordering effect. In addition, further research would also benefit from exploring preferences across the gender spectrum (e.g., transsexual women) as well as across the sexual orientation spectrum (e.g., pansexuality). For example, it would be interesting to investigate how preferences for male faces and female faces relate among bisexual women. Also, it would be interesting to examine whether the preferences for sexual dimorphism in female faces among homosexual women follow the reverse pattern of the one found in our study for sexual dimorphism in male faces among heterosexual women. In other words, it would be interesting to investigate whether there would be a negative effect of sexual attraction to men and a positive effect of sexual attraction to women on homosexual women's sexual dimorphism preferences in female faces. Lastly, examining the effect of face ethnicity on judgements of attractiveness would also be beneficial.

In conclusion, our study helps advance the field by showing that variation in sexual attraction to men and women does influence the facial sexual dimorphism preferences of heterosexual women. This suggests that the continuous nature of female sexuality is reflected in preferred partner characteristics. Therefore, future partner preference studies need to account for this variability when examining their variables of interest.

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Table 1. Univariate effects on average sexual dimorphism preferences

	M	SD	F	η_p^2
Sexual attraction to men	6.61	0.77	16.60**	0.004
Sexual attraction to women	2.13	1.22	8.20**	0.002
Relationship status	1.43	0.50	26.55**	0.001
Contraceptive use	0.41	0.49	5.80*	<0.001
Own age	21.56	2.28	24.68**	0.001
Mean sociosexual attitude	2.95	1.64	4.56*	<0.001
Own attractiveness	4.47	1.29	90.12**	0.003

***p<0.001, *p<0.05*